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THE DEVELOPMENT OF RHODESIA FROM A GEOGRAPHICAL STANDPOINT.

H. Wilson Fox.

Read at the Meeting of the Society, 17 April 1916. Map following p. 368.

MY purpose this evening is to survey the geographical conditions of Rhodesia, and to point out how those conditions have influenced the nature, extent, and locality of the development which has been carried out in that country since the incorporation of the British South Africa Company in 1889. It may be convenient if I recall to you in the first place the main geographical features of the country which are to-day well known.

The great central plateau of Central and Southern Africa, which has a normal elevation of from 3000 to 7000 feet above sea-level, is bounded on the east for the greater part of its length by a mountainous and abrupt escarpment running more or less parallel with the coast and at a distance from it of about 150 miles. This plateau extends normally throughout Rhodesia, but the contour of the country has been profoundly affected by the various river systems which traverse it more or less from west to east. These rivers and their tributaries have considerably denuded the plateau on their course to the sea, which they reach in Portuguese territory after passing through deep gorges in the eastern escarpment. The more important of these rivers are the Zambezi and the Limpopo.

Southern Rhodesia, which is bounded on the north by the Zambezi and on the south by the Limpopo, mainly consists of one high plateau occurring as a hog's back, or saddle, between the valleys of these two rivers, but modifications are introduced into the general plan by the rivers Sabi and Nyagadzi and their tributaries. The elevation of this plateau varies from 3500 to 6000 feet. The Sabi rises at a point near Umtali and, running southwards parallel to the main escarpment for a considerable distance until it almost reaches the Limpopo, cuts a deep and wide valley out of the main plateau. The effect is to isolate the eastern or Melssetter portion of the plateau from the high ground lying to the west of the Sabi River, and to convert it into an independent plateau. North of Umtali the Nyagadzi River and its tributaries in their course to the Zambezi isolate in similar fashion, though not nearly to the same extent, the high region of Inyanga.

Northern Rhodesia might be represented as the southern half of a plateau in the form of a somewhat bent saddle separating the waters of the Zambezi from those of the Congo, were it not that the Zambezi and its great tributary, the Luangwa, constitute a deep and practically straight trough which runs north-east for about 650 miles, from Walker's Drift on the Zambezi to a point near Mirongo in the vicinity of the north end of Lake Nyasa. The Zambezi section of this trough constitutes the greater portion of the southern boundary of Northern Rhodesia. The Luangwa section of the trough, like the Sabi River in Southern Rhodesia, has the effect of isolating the eastern portion of the main plateau from the interior. This deep trough, or valley, is one of the most striking features of the geography of Rhodesia. It is bounded on its western side by a very steep and sheer escarpment, termed in places the Muchinga, varying in height from 1000 to 2000 feet, through which all the tributaries of the Luangwa and Zambezi from the west have cut their way to the valleys below, and pass as roaring torrents through gorges of the wildest character. To the east of this great trough lies the limited area of high land that I term the Fort Jameson Plateau, which separates the valley of the Luangwa from a further valley to the east, running north and south, in which is situated Lake Nyasa. To the west of the trough a tongue of the Tanganyika Plateau, grooved and furrowed by the Kafue River and its tributaries, extends southwards and forms a subsidiary saddle between the Zambezi and Luangwa Valleys. The southern end of this saddle is known as the Batoka Plateau. The average elevation of the central plateau of Northern Rhodesia is somewhat higher than that of the corresponding region in Southern Rhodesia.

The greater portion of the territory lying to the extreme north is on the highest portion of the Congo-Zambezi saddle, in the country known as the Tanganyika Plateau. A comparatively small section of country to the north-east in the vicinity of Lake Tanganyika lies on the Congo side of the divide, and forms part of the upper slopes of the Congo Basin. In this region occur the upper waters of the Luapula and Lakes Bangweulu and Mweru. It is isolated to a considerable extent from the remainder of Rhodesia by a tongue of Belgian territory.

In order to convey some idea of the relative extent of the high and low ground, the accompanying map has been prepared from the best data available. It divides Rhodesia into three zones, which are distinguished from one another by their altitude above sea-level. The regions of highest altitude are taken as comprising all portions of the territory with an altitude of 3500 feet or more. Regions of lowest altitude comprise those portions of the territory with an altitude of less than 2500 feet. The intermediate regions have an altitude of from 2500 to 3500 feet.

With regard to climate it must be remembered that Rhodesia lies wholly within the tropics, and that the extent to which it can be considered to be a white man's country is largely conditioned by considerations of

altitude. I have already shown you that the altitudes differ considerably in different districts, and it is consequently not possible to speak of the climate in general terms which are applicable to the whole country. The conditions experienced in the trough of the Zambezi and Luangwa valleys, and in the neighbourhood of Lake Bangweulu, are wholly dissimilar to those met with on the plateaux where European settlement is taking place. On these plateaux, both in Southern and Northern Rhodesia, the climate is delightful. The days are sunny and the nights are cool. In winter one often suffers from cold, while in the summer the occurrence of the rains tempers the sun's heat. As one passes from south to north, and the sun's rays become more powerful, a greater altitude is needed to establish similar conditions. It may, however, be said with confidence that the experience of Rhodesia so far as it goes is that, given reasonable precautions against malaria, Europeans can work, thrive, and bring up healthy children at comparatively low altitudes, certainly in Southern Rhodesia, at an altitude of less than 3500 feet. I am aware from past controversies in this room that in expressing this view I am treading on dangerous ground. I have, however, the strong support for it of the most competent authorities in Rhodesia, and feel bound to place it on record.

The rainfall throughout Southern Rhodesia is seasonal, by far the greater portion of the rains falling between the end of November and the end of February. From the end of March to the middle of August rain practically never falls, but there are usually light showers in the course of August or September. October is usually dry. The southern portion of Northern Rhodesia exhibits conditions generally similar to those met with in Southern Rhodesia, but as the Congo watershed is approached the seasonal character of the rainfall is subject to local variations.

I exhibit with some diffidence a map which shows the distribution of rainfall throughout Rhodesia in an assumed average year (*Map*). Rainfall maps are proverbially inaccurate, and I cannot claim exceptional virtues for this one. The most I can say is that it has been compiled from the best data which are at present available. In Southern Rhodesia meteorological stations are rare, and records have not extended over sufficiently long periods to admit of accurate conclusions. The records which we possess have been largely due to the scientific work of the Jesuit Fathers, notably of Father Goetz. In Northern Rhodesia still fewer records have been kept, and for this portion of my map I am indebted mainly to a map published many years ago by Sir Harry Johnston, whose conclusions you will be glad to learn have been substantially confirmed by later observations.

One effect of the distribution of rainfall in Southern Rhodesia and its marked seasonal character is that, west of a line which roughly coincides with the artificial boundary which separates Matabeleland from Mashonaland, the rivers in normal seasons are not perennial. In the dry season they usually shrink to a series of pools separated by stretches of sand or

rocks. In Mashonaland practically all the rivers carry running water throughout the year. The irrigation possibilities of Rhodesia cannot be compared with those possessed by countries such as India and Egypt; but this statement must not be taken to imply that these possibilities are negligible. On the contrary, the investigations which have already been made show that at various places in Southern Rhodesia important irrigation projects can be carried out, and that with the aid of reservoirs very considerable areas can be placed under irrigation. The marked seasonal character of the rainfall in Southern Rhodesia and the contour of the country lead also to the belief that a large number of small irrigation projects will be carried out by individual farmers or by associations of farmers. Having regard to the value and extent of the production which experience elsewhere has shown to result from the scientific cultivation of irrigated areas, the fact that irrigation possibilities, which in the aggregate are considerable, exist in the more elevated regions of the territory must necessarily have an important bearing upon the future production and wealth of the country. The great river valleys, notably the Zambezi, Sabi, and Kafue, also present great possibilities in certain districts. Unfortunately, the annual flooding which extends for miles in the region of the Zambezi known as the Barotse Valley, and on the middle Kafue, is not accompanied by any appreciable deposit of fertilizing silt, I presume because, owing to the topographical features of the Zambezi-Congo divide, no considerable denudation is taking place in that region.

Rhodesia is on the whole a well-wooded country and compares very favourably in this respect with the Union of South Africa, but none of its forests in the least resemble the dense evergreen forests which are met with in the coastal regions of the Cape Colony and Natal. The Rhodesian forests are generally of an open character of the Savannah type. Very large areas are covered by scrub, and in certain districts forest trees are met with, notably in Southern Rhodesia in the regions lying to the north and north-west of Bulawayo, and on the slopes of the more mountainous regions of the territory. In Northern Rhodesia very large areas of scrub are also met with, the true forests mainly occurring in the vicinity of the Luangwa Valley and the Congo divide. Partly because of the somewhat inaccessible districts in which large timber trees occur, and partly because there is at present little demand in Europe for the heavy hard woods which the majority of these trees produce, the forest areas of Rhodesia have not up to the present been cut for export on any appreciable scale. They have, however, been of the utmost value for the supply of fuel and mining timber. The forests in the neighbourhood of the Igusi, Khami, Gwaai, and Shangani Rivers furnish the so-called Rhodesian Teak and Rhodesian Mahogany woods, which are much esteemed locally for building purposes and for furniture. They are also being used on a large scale for railway sleepers. A valuable redwood is cut in the forests of the same region, which is conspicuous for immense tracts of deep sand. The trees in consequence



THE SHAMVA DISTRICT, MASHONALAND.

Phot. by Messrs. Strachan & Co., Salisbury.



THE SOURCE OF THE ZAMBEZI.

Negative by Mr. J. C. de Josselin de Jong.

are able to extend their root-systems to great depths and are thus in a better position to resist droughts. Unfortunately the prevalence of veld fires, which are difficult to control in these sparsely populated regions, has had a prejudicial effect upon many of the trees. A very full and interesting account of the forests of Southern Rhodesia is contained in Reports by Mr. James Sim, F.H.A.S., of the Forestry Department of the Union of South Africa, which have been published by the Department of Agriculture of Southern Rhodesia (Bulletin No. 71). Much less information is at present available in regard to the forest areas of Northern Rhodesia, which can obviously have little value from a timber point of view for many years to come. It may be interesting to state that the greater portion of the Barotse Valley region is practically destitute of trees, and that the natives in that area experience great difficulty in procuring timber for their canoes and buildings.

The presence of the tsetse fly constitutes in our present state of knowledge one of the greatest obstacles to the development of vast areas. While Southern Rhodesia is infested by this pest only over limited and isolated patches in the vicinity of the Zambezi Valley, its occurrence in the territory of Mozambique to the east makes transport by draught animals between that region and Rhodesia both difficult and expensive. A belt of fly is similarly interposed between the Fort Jameson Plateau in Northern Rhodesia and the regions to the east. In Northern Rhodesia, as you will notice, fly is very prevalent, though fortunately some of the best agricultural and stock-raising land in the territory is wholly free from it, notably the Barotse Valley, the middle Kafue Valley, and the Tanga-nyika and Batoka Plateaux.

I do not propose to venture upon any account of the geology of Rhodesia. So far as Southern Rhodesia is concerned a considerable body of literature exists upon this subject. The main features of the country have been dealt with very fully by local observers—notably by Mr. Mennell, Mr. Molyneux, and Mr. Maufe—and high authorities such as Prof. Lamplugh and Prof. Gregory have visited the country and recorded their views. Valuable conclusions in regard to it have also been stated in the papers recently contributed to this Society's *Journal* by Mr. C. O. Thiele as the result of investigations carried out in the neighbouring territory of the Companhia de Mozambique. The principal formations are the granite, the schists, and banded ironstones in which most of the gold occurrences are found, and the forest sandstones which contain the coal-measures and in which small finds of diamonds have been made. Of the geology of Northern Rhodesia we know less, though it may be said that over wide areas visited by Mr. Molyneux, notably in the regions abutting upon the middle course of the Zambezi, the physical conditions closely resemble those which occur in Southern Rhodesia to the south of the river. Northern Rhodesia, however, still offers a wide field for original geological research. Both in Northern and Southern Rhodesia hot mineral springs are met with,

notably near Fort Jameson, in the region of the lower Kafue, and in the Melssetter District.

As geographers I am sure you will be glad to be reminded that from the strictly scientific side the British South Africa Company has not been remiss. Partly from a desire to promote an important scientific object, but largely as the consequence of the persistence of the late Sir David Gill, the Administration of Rhodesia contributed handsomely both assistance and funds to the work of the Geodetic Survey, which has been carried from Inugu south of Bulawayo in Southern Rhodesia to Mpanga in Northern Rhodesia, a short distance south of Lake Tanganyika.

On the last occasion when I was present in this room I had the pleasure of hearing a most instructive paper by Sir Thomas Holdich on international boundaries. My main regret then was that Sir T. Holdich had not been concerned with the delimitation and demarcation of the boundaries of Rhodesia. Few territories have been worse mangled through want of proper geographical knowledge. Its boundaries, so far as I can understand, have every conceivable fault. They impede development and they promote controversy. Look, for instance, at the Caprivi strip—a boundary now in course of rectification—which gave Germany access to the navigable waters of the Zambezi just at a point where, as I shall show you presently, those waters are most emphatically not navigable. Look also at the western boundary of Barotseland—a straight line which ruthlessly cuts in half the well-ascertained limits of the Barotse area. I hope that in time our diplomatists may be equal to repairing the ravages of their predecessors.

The means of communication with the outer world which Rhodesia had in 1889 will next be considered. The Cape railway system ended at Kimberley, and the Transvaal system had reached Pretoria, but no through road north from Pretoria had been established at that time. The only practical route was the road or track followed by traders and hunters which traversed the deep sands of Bechuanaland to Khama's country and extended from there to the north. A branch of this road to the west, known as the Panda-ma-Tenka road, reached the Victoria Falls. The swamps near Fontesvilla in the vicinity of Beira, the character of the country inland, and the occurrence of tsetse fly effectually barred at this time any communication between Beira and Mashonaland. Communication by river with the east coast was also, and still remains, impracticable.

Rhodesia at this period was in native occupation. A few European missionaries and traders were established there, and the country had been visited by explorers and hunters, notably by Livingstone, Baynes, and Selous, but the knowledge available in regard to the resources of Southern Rhodesia especially was extremely limited. The only wealth of the natives was their cattle. Gold and other minerals were believed to occur, but it is obvious that the difficulties in the way of development of permanent and payable industries were enormous. The Pioneer Column entered the country in 1890 by the Tuli Drift on the Limpopo, and made

what is known as the Column Road, which reaches Salisbury *via* Victoria and Charter. Mashonaland was then occupied by the Company, but the peaceful development of Southern Rhodesia as a whole only became possible with the defeat and death of Lobengula in 1894, and the suppression of the Matabele and Mashona Rebellions in 1896 and 1897. Up to that time no railway had reached the country; but owing to the early realization by Cecil Rhodes that railway communication with the sea was an essential preliminary to any serious development, the line from Kimberley was rapidly approaching the Southern border in 1897, and a line from Beira was nearing the Portuguese Border in the neighbourhood of Umtali. The extent of the railway development of which these lines to-day form part is shown in the map (following p. 368), in which you will notice that the general trend of the railways running to the north is north-east, and that they run more or less parallel with the east coast. I have often thought that the explanation of this fact lies in the distribution of rainfall which tends to become less as the interior is approached. Consequently the innermost lines tend to be confined within the regions which are more or less well watered. Where valuable discoveries of minerals are made, and as civilization advances, the provision of artificial water supplies becomes practicable, and the tendency to which I refer will be less noticeable. You will observe that the Rhodesian line through the Bechuanaland Protectorate is at a considerable distance from the coast, owing to a bulge in the coast-line, which may possibly account for the exceptionally low rainfall in these regions.

This map also illustrates the manner in which the lay-out of the Rhodesian system has been materially affected by geographical conditions. In a new country railways, for financial reasons, have a habit of following the lines of least resistance. Expensive construction has to be avoided because distances are great and centres of traffic rare. It is generally cheaper at the outset to run a line for a long distance inexpensively than to undertake heavy work over a shorter distance. Tunnels, deep cuttings, and big bridges are only constructed in case of absolute necessity. It follows, therefore, that districts which require heavy work to reach them are apt to be neglected unless their immediate prospects are exceptionally attractive from a railway point of view. As the result of these conditions you will notice that some of the best districts in Rhodesia from a stock-raising and agricultural point of view are still without railway connection with the coast. I refer to the Melsetter, Inyanga, Fort Jameson, and Tanganyika Plateaux. Up to the present no important discovery of minerals has been made in any of these districts, while their agricultural land is somewhat limited in area. Note also the absence of direct railway connection between Salisbury and the Kafue. The indirect route between these points extends over about 900 miles instead of only 300 to 400 miles. But the trough of the Zambezi presents many engineering obstacles, with the result that the construction of this link has had to be postponed. The total

mileage of the railways which the British South Africa Company has been instrumental in constructing is about 2500 miles, at an approximate cost of £15,000,000.

In the development of a new country questions of transport, which are everywhere important, are all-important, as even enlightened natives fully recognize. Some years ago Lewanika, the great Chief of the Barotse, who died last February, was pressed by an enthusiastic Native Commissioner to encourage his people to grow cotton in the Barotse Valley. His reply was very much to the point: "What is the use? They can't eat it." It is a truism to state that efficient and cheap production, however successful it may be from an experimental point of view, cannot be placed upon a commercial basis in the absence of efficient means of transport. This elementary fact is, however, very frequently overlooked; enthusiasm is apt to outpace discretion, with the inevitable consequence of failure and disappointment.

I do not think that any of us can as yet quite realize the important effect which the petrol motor is gradually exerting upon the conditions of colonial development. In Rhodesia motor bicycles have become quite an ordinary means of transport for district officials and engineers, who fly about the country on them over paths which are often the merest tracks. These machines are to be found in the remotest regions of Northern Rhodesia. The light motor-car is also beginning to be looked upon as quite a necessary part of the outfit of a well-to-do farmer, and is adding enormously to the attractions and amenities of country life. Englishmen and their wives are gregarious animals, and mainly because of this characteristic Cecil Rhodes used often to say that his difficulty throughout Africa was to induce the Englishman to remain on the land. It is a difficulty not unknown in this country. In Africa where farms are generally large, and the distances between neighbours and centres of population proportionately great, the solitariness of farm life is quite naturally a great deterrent to settlers. Some people are constitutionally incapable of facing it; others are nervous about the accidents of life, and quite reasonably so. You can imagine, therefore, the effect which is produced upon settlement by the knowledge that a telephone is within easy distance, and that half an hour's run or less in a car will provide social or business intercourse. The next steps will be the introduction on an extensive scale of the motor tractor and the motor lorry, when the extension of serious agricultural settlement into districts, which at present are too far from a railway to allow of the successful marketing of produce, will become practicable. A service of lorries has lately been established to run over the fly country from Kashitu, about 60 miles north of Broken Hill, to Lake Tanganyika to aid in the supply of our forces in that region.

I will deal next with the commercial activities which have become possible as the result of the company's policy of railway construction, and I may remind you that, at the outset of its career, the British South Africa

Company was heavily handicapped in comparison with other great chartered companies, such as the East India Company, the Hudson Bay Company, and the Niger Company. In addition to the handicap due to the inaccessibility of its territory, it suffered from the disadvantage that there were no trade or other commercial opportunities which could be seized immediately. Everything had to be built up from the beginning. In comparison with the coastal regions of South and Central Africa, Rhodesia was sparsely inhabited by natives low in the scale of civilization, naturally indolent and with few wants. There was no native trade worthy of the name to be developed. The country was not producing on any appreciable scale vegetable or mineral products possessing great value in small bulk, such as precious stones, alluvial gold, rubber, or furs, which could be easily acquired and traded by natives or other unskilled persons. The wealth of Rhodesia has to be won by the application of labour and capital to the soil. It was impossible therefore to make the company even approximately self-supporting from the outset. By slow degrees, and at great cost, it has been brought to the stage at which remunerative industries have been established.

Fortunately, the mineral wealth of the country has proved to be exceptional. The success of the mining industry has given the country its start, and mineral production is likely to remain for some years to come its chief source of wealth. The gold belts actually worked cover a large area, a fact which augurs well for further discoveries. The total value of the gold produced since 1889 has been £32,685,432. The production in 1915 amounted to £3,823,167, bringing Rhodesia to the sixth place in the list of the gold-producing countries of the world. Amongst British possessions it now ranks fourth. In Northern Rhodesia no gold discoveries of importance have as yet been made, though favourable results have been obtained on a small scale in the neighbourhood of Fort Jameson.

Rhodesia possesses in the Wankie coalfield one of the great coalfields of the world. The tonnage available is enormous, and the coal both as a steam-coal and as a coke-producing coal is of exceptionally high quality. Coal has also been met with at other points in the Zambezi and Limpopo Basins, but Wankie is the only place at which it has hitherto been worked commercially.

The chrome iron-ore deposits of Rhodesia, which occur in the Selukwe District of Southern Rhodesia, are also remarkable. Of a world's annual consumption in 1915 of about 120,000 tons Rhodesia produced 60,000 tons or 50 per cent. of the whole. The Selukwe district also contains important deposits of asbestos, which is being worked on an increasing scale. The mines in Northern Rhodesia have hitherto been of less importance, and its mineral wealth so far as at present known appears to consist mainly of deposits of zinc, lead, and copper, some of which are expected to prove of considerable value. It is worthy of note that the Victoria and the Gonya Falls on the Upper Zambezi, and the falls of the Kafue, Lusenfwa, and

other rivers which descend from the central plateau into the Zambezi-Luangwa trough, will at some future time doubtless be utilized for the development of metallurgical and other industries.

The stock-raising, agricultural, and horticultural industries of Rhodesia have hitherto been mainly confined to regions situated on the plateaux at an altitude of not less than 3500 feet. Nothing has as yet been done to develop those portions of the territory which, owing to their low elevation, possess a more tropical climate. Agricultural development is moreover, for the present for obvious reasons, practically confined to districts which are situated not more than 25 miles from a railway. Stock-farmers can, of course, go further afield.

Both Northern and Southern Rhodesia are first-rate stock countries, but the extent of the areas in Northern Rhodesia suited for stock-raising is necessarily limited by the distribution of the tsetse fly. Fortunately the Barotse Valley on the Upper Zambezi and the Middle Kafue are both free from fly, and are capable of carrying very large herds. In Southern Rhodesia the best cattle districts for ranching purposes are to be found in Matabeleland, which in Lobengula's time was heavily stocked. Mashonaland is also a good cattle country, but owing to its higher rainfall it is generally more suitable for the fattening of stock and dairying than for ranching.

The chief grain centres of the territory occur in Southern Rhodesia in the vicinity of Salisbury, notably on the Gwebi Flats and in the Mazoe Valley, and in the Victoria District. In Northern Rhodesia the best grain districts are to be found in the Kafue neighbourhood. Maize is the staple crop grown by Europeans, but rice and various varieties of millet are produced in great quantities by native cultivators. Ground-nuts and sunflower-seeds are beginning to be produced on an increasing scale for the manufacture of oil. Tobacco grows everywhere, but its success from a commercial standpoint entirely depends on cost of production. Its prospects in Mashonaland and in the vicinity of Fort Jameson are encouraging. It is probable also that in a few years' time Southern Rhodesia will export citrus fruits on a large scale to Europe. Apples have been tried with varying success, and may in time succeed in the vicinity of Inyanga.

Owing to the distances which intervene between Rhodesia and the markets of the Union, Rhodesia has already been compelled to face the problem of export, and to promote co-operation between producers with this object. A large tonnage of maize has already been exported. Considerable quantities of tobacco have been sold on the London market, and experimental shipments of oranges have been made successfully. The export of meat and other cattle-products is receiving attention, and I look forward with confidence to the day when Rhodesian chilled meat will be exported to this country *via* one of the West Coast ports. But before this can occur large herds must be built up and the standard of local cattle improved. This will take time, but meanwhile there is every

reason to expect that a considerable export of canned meat will take place, and possibly also of dairy products.

So far I have referred only to the possibilities in the more elevated regions. In the future, when the Salisbury Railway reaches the Zambezi, I have little doubt that a number of valuable products of a more tropical character, such as cotton, sugar, sisal and other fibres, rubber, and oil seeds, will be raised by planters in the low-lying regions which abut on the Zambezi and Luangwa rivers and their tributaries.

As regards wild rubber, a number of rubber-producing plants of the genus *Landolphia* are met with over considerable areas in Northern Rhodesia. They include several species of rubber vines and of bushes which produce root rubber. The quality of rubber produced is excellent, and the payability of the industry depends entirely on the density of distribution of the plants and the costs of transport. The British South Africa Company has established a steam factory at Chambesi, which started work just before the war broke out, but which, owing to the shortage of labour brought about by the military operations on the Northern border, has been temporarily closed down. It had, however, been at work sufficiently long to enable samples of the product to be sent home and to supply data in regard to costs of production. As the result of this preliminary information I can state that the production of rubber is likely to become one of the staple industries of Northern Rhodesia.

It may be convenient at this stage to refer to the possibilities of river transport in Rhodesia, which at present are completely undeveloped. The Zambezi and its great tributaries, the Kafue, the Luangwa, the Eastern and Western Luena Rivers, the Kabompo and the Lungwebungu, comprise between them many hundreds of miles of navigable waterways. Some of these waterways are available throughout the whole year, but others can only be utilized for limited periods. In Southern Rhodesia it is possible that use may eventually be made, as waterways, of short stretches of the Sabi and Limpopo rivers, but the probability is small that either of these streams can ever become an important factor in Rhodesian development.

The Zambezi possesses three main sections which may be generally described as navigable. The stretch of about 70 miles which extends from Sesheke to the mouth of the great gorge below the Victoria Falls comprises many rapids, falls and gorges, and separates the Upper Section from the Middle Section. The Kebrabasa Rapids in Portuguese territory which extend for about 60 miles separate the Middle from the Lower Section.

All the three sections have been thoroughly investigated by competent observers, notably by Major A. K. St. Hill Gibbons and Mr. H. de Laessoe. To Major Gibbons belongs the credit of having, in 1901, successfully ascended the middle section of the river in a steam launch, from the Kebrabasa Rapids to the foot of the gorges below the Victoria Falls.

This exploit was the more remarkable because it was undertaken at the period of lowest river. Mr. de Laessoe descended the middle and lower sections of the river by boat in 1903. The navigation of the lower section, though practicable at all seasons, is carried on with considerable difficulty through channels that constantly shift and are impeded by sandbanks, and the mouth of the river at Chinde offers an uninviting port. It is unlikely, therefore, that commercial connection between the Middle and Lower Sections will be established for many years, seeing that connection by rail around the Kebrabasa Rapids would involve the construction of a railway about 70 miles in length. It is probable, therefore, that any future trade which may arise through the opening up of the middle section of the Zambezi for traffic will pass over the Rhodesian railway system.

The Middle Zambezi, over a continuous distance of 485 miles, can probably be made navigable for steam launches and barges during at least eight months in the year, and perhaps for the whole year. The current of the river is on the whole sluggish in this section, and where rapids occur they are usually the result of obstacles that are capable of removal, and in any event disappear when the level of the river rises after the rains. Wide expanses of country at various points on the banks of the river are known to be valuable from an agricultural point of view, and in places there are reported to be large tracts capable of irrigation.

On the Upper Zambezi and its tributaries many hundreds of miles of waterways can be made available for light flat-bottomed barges at comparatively small cost. On the Zambezi itself 550 miles are navigable. The rivers in the Kasempa district in the extreme north are generally deep, sluggish, and free from obstacles, and their use can be extended over wide areas. The Lungwebungu, one of the larger tributaries, is said to provide 400 miles of waterway, and the Kabompo, another tributary, 150. The Upper Zambezi system alone includes, therefore, 1100 miles of useful waterways. The natives throughout this region are skilled boatmen.

The Kafue, like the Zambezi, is divided into three sections which are completely separated from one another for purposes of commercial navigation by formidable rapids. The lower section comprises a short stretch of only some 30 miles, and constitutes the course of the river in the Zambezi valley proper, after its descent from the Batoka Plateau. For the purpose of navigation the middle section of the river is the most promising. It constitutes a magnificent waterway of about 200 miles, extending west and north-west from the point where the railway crosses it at the edge of the Batoka Plateau. The river is navigable by tugs and barges, and large tonnages of produce or minerals could be handled upon it without difficulty. If suitable river craft were provided, and native trade encouraged, the district would certainly provide an excellent and increasing traffic. It had been decided just before the war to place on this section a powerful stern-wheeler with a draft of two feet when loaded. It was designed to have accommodation for 16



LAKE BANGWEULU.



ON THE LUANGWA RIVER.



TYPICAL COUNTRY IN MATABELELAND.



THE INYANGA MOUNTAINS.

passengers, and to be capable of carrying 40 tons of cargo, and of hauling four lighters each carrying 50 tons. The execution of this project has been postponed, but I trust only temporarily.

In the extreme north the navigable sections of the Luapula in the vicinity of Lake Bangweulu also provide 250 miles of useful waterway, which at the present moment is being utilized with great advantage for the supply of the forces operating near Lake Tanganyika. This route is likely to be valuable for the export of rubber.

The conditions which exist in the Luangwa Valley have been fully described in papers which have been communicated to this Society by Mr. L. A. Wallace, C.M.G., the Administrator of Northern Rhodesia, whose excellent example has stimulated many members of his staff to undertake valuable geographical work on their own account. For knowledge of this region we are also indebted to Sir H. Johnston, Sir Alfred Sharpe, and Mr. Sheffield Neave, and more recently to those brave members of the Sleeping Sickness Commission, under the direction of Dr. Aylmer May, C.M.G., the Principal Medical Officer of Northern Rhodesia, who, at the risk of their lives, have carried out researches which have greatly increased our knowledge of the conditions of occurrence of this terrible disease, and have reassured us so greatly in regard to the danger of its extension.

The development of this valley presents certain special difficulties because of its secluded character. It is bounded on the west throughout its length by a steep and sheer escarpment of from 1000 to 2000 feet in height, through which railways could only be carried to the higher plateaux on that side at widely separated points and at great cost. On its eastern side it is bounded by the high Fort Jameson Plateau, to which access by railway from the valley would also be difficult and costly, and from which there is at present no cheap route to the coast. A rough road, that could be made available for waggon transport, gives access from the lower sections of the valley to the Rhodesian railway system at Broken Hill; but there is some fly upon the road, and only valuable produce can bear the cost of transport to the coast by this route. It may serve a temporary purpose, but it cannot be relied upon for permanent development. If, then, this rich valley is ever to be in a position to export its produce cheaply, it will be necessary either to make use of river transport, or to build a railway up the valley so as to connect it with the Middle Zambezi, the Southern Rhodesian railway system. The outlook for water transport is unfortunately not favourable. The river is not navigable at all during nine months of the year, and while it is probably navigable for three months by light craft going downstream over a distance of 250 miles, it is uncertain if it can ever be used for upstream traffic. Its usefulness as a waterway is accordingly negligible.

From this survey of Rhodesian rivers you will realize that stretches of navigable waterway amounting in the aggregate to approximately 2000

miles may in time be expected to become available for commercial traffic, and to act as important feeders to the Rhodesian railway system. While the efficiency of these waterways as a means of transport is of course not comparable with that of even light railways, it must be remembered that the cost of construction in these remote districts of railways of even the lightest character over this total distance would be not less than £5,000,000. The Middle Zambezi will be linked up with Salisbury and Beira when the line from Salisbury to Sinoia had been extended for a further 172 miles. The Middle Kafue is already connected with the Rhodesian railway system, and the waterways of the Upper Zambezi region can also be connected with it by the construction of a line about 40 miles in length from Livingstone to Katomboros.

I have so far said very little in regard to the inhabitants of Rhodesia. When the British South Africa Company first entered the territory the condition of the native population was in every respect deplorable. Matabeleland was occupied by a branch of the Zulu tribe who had migrated from the south and established themselves in that portion of Southern Rhodesia which, as I have told you, comprises the best pastoral country. Lobengula, the paramount chief, was a despot who, in accordance with the traditions of the Zulu race, and for his own safety, ruled his subjects with a rod of iron. No man's life was safe; witchcraft was freely practised; slavery was an institution; the military spirit of the Matabele warriors was fostered by means of frequent attacks upon the persons and property of the subject tribes, and by raids into the territories of the neighbouring chiefs, of whom Khama, Lewanika and Gungunyana were the most important. The condition of Northern Rhodesia was no better. The western portions were under the rule of Lewanika, who, like Lobengula, governed as an uncontrolled despot. The eastern portions, with the exception of those regions occupied by the Awemba and the Angoni, were inhabited by comparatively unimportant native tribes living for the most part as village communities. Slavery was rampant, and large districts were systematically raided by slave-gathering expeditions headed by Arab slave-dealers from the neighbouring Portuguese and Congo territories. I contrast with these conditions those which exist to-day. In the short period of twenty-five years life to the majority of the native inhabitants of Rhodesia has been given a new meaning and a new outlook. A few figures will, I think, bring home to you more eloquently than words can picture it the improvement which has taken place under the rule of the British South Africa Company. In the year 1898-99, when considerable improvements had already been effected, the native population of Southern Rhodesia was estimated at 413,778. The figure at the close of 1914 was about 750,000. In 1901 they owned 43,926 cattle; the corresponding figure at the end of 1914 was 406,180.

I cannot give you similar figures for Northern Rhodesia, but the increase in population which has taken place since the slave trade has

been suppressed is known to have been considerable. The native population of Northern Rhodesia is to-day approximately 850,000. In regard to the material prosperity of the natives, the figures of Government revenue are most striking. When the Company began its work practically no native revenue could be collected for the simple reason that the natives had no means out of which to pay taxes. Their only wealth was their cattle, and their agricultural production, mainly because there was no market, was not in excess of their own requirements. To-day they are able to dispose of their surplus products, and have also many opportunities of securing remunerative employment. As the result of these conditions the natives of Rhodesia are now able to contribute to the public revenue without the slightest hardship a sum of approximately £350,000 per annum in direct and indirect taxation. The acreage cultivated by natives is steadily increasing, and the marked improvement in their methods of agriculture is very striking. For instance, the use of ploughs instead of hoes is becoming universal in Southern Rhodesia, the substitution being strongly supported by the women—the principal wielders of the hoe. The desire of the natives for education is also a most striking feature and most encouraging to those who like myself believe that the prosperity of a territory is best promoted by utilizing the physical and mental capacities possessed by every one of its inhabitants to the utmost possible extent. One of the lessons of this war is that national welfare demands that the drone, either male or female, should be eliminated, in which event we need have no fear as to our future ; for if all who can work are encouraged and educated to work in the directions best suited to their capacities there will be wealth, and to spare, for all. I found upon this belief my greatest hopes for the future of Rhodesia which, as I have shown you, is so richly endowed with resources that require for their full development the organized labour and co-operation of all its inhabitants, both European and native.

The settled areas in Southern Rhodesia have a European population now exceeding 30,000 persons. In Northern Rhodesia the European population is only about 2000, while settlement has been practically confined to three centres in the vicinity respectively of Livingstone, Lusakas, and Fort Jameson.

Of this population I need only say on the present occasion that they are of the stuff of which Empire-makers are made, and that they have always exhibited those virile qualities of courage and endurance without which the special difficulties of a new country cannot be overcome. The numbers of this population are at present small, some 32,000 in all, men, women, and children ; but the results to which it has contributed are so striking as to require for their proper understanding a right appreciation of the part played by Europeans in what are primarily native territories ; where the part of the European is broadly speaking to organize and supervise labour. Let me give you some figures. The total exports of Rhodesia during the ten years ended 31 December 1914 represented a

value of £25,928,481, and the corresponding value for imports is £30,484,384, showing a total trade during that period only of £56,412,865. The high-water figure was reached in the year preceding the war when the exports from Rhodesia (North and South) amounted to about £4,500,000, and the imports to about £3,500,000, giving a total trade of approximately £8,000,000. A very important fact is that of this total trade at least £6,000,000 took place with Great Britain. Is it not very remarkable that the effect of establishing 32,000 persons in this new territory should have given rise in so short a time to a trade of such dimensions? You will perhaps think it even more remarkable when I tell you that the annual value of the total trade of Great Britain with Germany before the war was about £130,000,000, or only about twenty times as large. Has not this fact a most important bearing on the real value to Great Britain of its territories overseas? On the one hand 30,000 of our own race give us a trade of about £200 annually per head of European population, while 70,000,000 Germans give us only £2 per head. Much of their trade, too, has been deliberately designed to injure us. Facts like these afford much food for reflection. They confirm the view which I have long held that the chief value to Great Britain of its tropical and semi-tropical possessions is not that they supply an outlet for surplus population, but that they provide the trade which enables an increased number of our people to live at home.

In face of what I have told you you may perhaps think that the possibilities in regard to European settlement in Rhodesia are limited. In comparison with Canada and Australia, which are destined to become the home of many millions of our race, it is true that the outlook for Rhodesia in this respect, owing to the conditions which I have described to you, is to some extent restricted. But the realization of these facts does not preclude the expectation that a great and continuous expansion will certainly take place in the numbers of the present European population, with corresponding benefit to the wealth and trade of the Empire. Many years ago, from consideration of the population statistics of Johannesburg, Kimberley, and Rhodesia, I formed the view that every additional native working in the mines means an addition of one person—man, woman, or child—to the European population. The conclusion is of course a rough one, but it is approximately correct. The development of the mineral wealth of Rhodesia has as yet hardly begun, for it is inconceivable that in existing circumstances more than a very small proportion of possible discoveries should have been made. A great mining industry gives indirect support to a large population, and, though many of us may not live to see it, the day will probably come when the iron deposits of Rhodesia which at present are entirely neglected will be worked. The agricultural, pastoral, and planting industries of Rhodesia will also attract to them quite considerable numbers of Europeans, and will specially attract those who for various reasons cannot maintain their health in more inclement regions. I hope that after the war Rhodesia will be able to provide a number of

our brave soldiers with the opportunity of making a fresh start, and of leading active and useful lives in conditions where the handicap of partial disablement or of impaired health will be less felt. That, at any rate, is the desire of the Company, and we shall do our utmost to realize it.

I trust that, in touching upon these important and most interesting questions I have not led you too far from the pleasant paths of geographical science, which, to my mind, has the greatest merit of encouraging its explorers and workers to stray from its high roads and to investigate the countries which they traverse. I also hope that I have succeeded in giving you some idea of the noble edifice which is being raised upon the foundations which were solidly laid by those great Empire builders Cecil Rhodes and Alfred Beit, assisted by many others whose names will ever be held in high honour in Rhodesia. Of the great Master-builders one only remains with us, that great Imperial Statesman—Sir Starr Jameson, the President of the British South Africa Company, who is now rapidly recovering from the effects of his recent severe operation. I am confident that all in this room will rejoice to know that he will shortly be able to resume that labour for the Empire to which his life has been devoted, and will recognize that the work of the British South Africa Company in Rhodesia, to which he has so greatly contributed, has been well and truly done.

Before the paper the PRESIDENT said: I will now ask Mr. Wilson Fox to read his paper on the Development of Rhodesia from a Geographical Standpoint. We all know Mr. Wilson Fox as a member of our Council and as an authority who can speak of Rhodesia from the intimate personal knowledge of many years.

(Mr. Wilson Fox then read the paper printed above and a discussion followed.)

Sir CHARLES METCALFE: The many maps that Mr. Wilson Fox has exhibited of Rhodesia this evening show the country very clearly, and I think you will see one of the important points about the country which has made the railway development a little difficult compared with, say, Siberia or India, or that grand country between the Missouri and Mississippi in the United States. Rhodesia is much more what the French call *accidenté*—much more up and down. In going along that portion of the Beira railway which looked so small on the map, from Massikessi up to Umtali, we had to climb 2000 feet in 17 miles. That shows you some of the difficulties. If you go over India you will see great flats stretching for miles and miles. It is the same in Siberia, and the same in the United States, and it gives them a great advantage over our country, because they can have a very much flatter gradient for their railways, which can take longer trains with less power. We have been fortunate in Rhodesia in the matter of waterways. When you go from South Africa, where there are practically no rivers that are navigable, and see the Zambezi, and then the Kafue and the other rivers, it is very refreshing, and you feel that some day they will be great feeders to the whole production and commerce of the country at a very slight cost. As Mr. Wilson Fox was saying, the great feature of the country is that you are in the tropics and yet at a high altitude, that is to say, you are at 3000, 4000, and up to 7000 feet

above the sea ; the consequence is your nights are always refreshing and cool during the hottest weather. I happened to be at the Victoria Falls, which is only 3000 feet above the sea, whilst the bridge was building, and I had a maximum and minimum thermometer, and took records all the time, and the hottest temperature at night in all those summer months was 55°. Compare that with what some engineers told me who were examining some coal and iron deposits for us in Rhodesia, that at Pittsburg night after night the temperature in the bedroom was 94°. At Philadelphia it is the same thing, and even in London during August we have all experienced extremely hot nights at times. You never have that in Rhodesia. That makes it extremely healthy, and you find that even children flourish. Mr. Wilson Fox has mentioned the woods which are called teak and mahogany. They are not really teak or mahogany, but they are absolutely like them when the wood is cut and worked up. The train made for the Duke of Connaught was entirely composed of teak from Rhodesia. We have not developed these forests to any extent because they are expensive to work. There are also enormous deposits of coal and iron. We have coal-fields for a thousand miles, the Wankie being the best of them. I have seen one of the seams 50 feet in depth. This coal was tested against the best Welsh steam coal by the Cape Government. They tried six trains, each with 150 tons load, using Wankie coal, and six similar trains and loads with the best Welsh steam coal, and I was told that the Wankie coal came out best in that trial. With all these great advantages we are confident that Rhodesia will become a great country. It will follow the usual course. Gold attracts the first settlers, and then others take up farming with cattle, agriculture, and fruit, and then other industries are started. I think that in four or five years we ought to be able to export cattle. The general increase I found in cattle, deaths and all included, was seven-fold in five years. If you had a million head now you ought to have seven million in five years' time. After that, of course, will come the industrial development for which the country is very well fitted. We are all very grateful to Mr. Wilson Fox for his interesting lecture, and also for the beautiful photographs, many of which I had never seen before.

Sir HARRY JOHNSTON : I think that our lecturer to-night has been too modest in drawing his maps ; but no doubt he thought it necessary to stick to the facts of to-day. I only point this out because I showed you a rather differently drawn map of Rhodesia about a year ago, which was accepted by many present without a protest. But there were a few who demurred because it transgressed the boundaries of adjoining countries. I had something to do with the making of the very first maps of Northern Rhodesia, and I found it was a good plan in those days to draw bills for posterity to honour. I had to fight against other ambitious pioneers who wished to secure for their respective countries as much as possible of Central Africa, and I believed in being first in the race as regards maps ; because people are very impressionable to printed matter, and if you showed them a map with your projected country on it, they took it as an accepted fact. In the course of 1889 I sketched out my plans on the spot, with the help of Sir Alfred Sharpe, Mr. Alfred Swann, and others. In 1890 I drew a map of what I then called "British Central Africa," studded with towns and with a magnificent system of (projected) railways. In the corner you saw a little notice to the effect that these lines were only projected. Many people did not look in the corner, and they turned aside and gave it up as a bad job if they were Portuguese or Germans. Occasionally there came along a tiresome literal-minded person who canoed along a river and failed to see "Fort Rosebery," "Gladstone," or "Rhodes," or whatever might have been

the town placed in that vicinity, though I usually had notice-boards erected to say they were there. Sometimes, therefore, their existence was denied. But the Imperial Government and the Chartered Company moved ahead very quickly, and it was not long before my ambitious maps became actually true. It is only twenty-six years ago since much of this was projected. Cecil Rhodes did not get seriously to work until about 1891. However, he honoured, as it were, the bills I had drawn against him, and before very long these towns, which in some cases were only represented in 1889 or 1890 by a stout stake with a painted board announcing the name, had become in 1892 or 1902 important places, with real streets and real Government buildings, bazaars, and stores. Fort Rosebery was one of the latest to materialize, and it was a source of some bitterness to Lord Rosebery that the explorers of other nations could not find the town named after him for years after it had been placed on the maps.

As regards the climate of this region, Livingstone remarked, "It really is an Italian climate." There is practically no fault as a rule to be found with the climate over much of Southern and Northern Rhodesia. You can, however, legitimately find fault with the climate of the Lower Zambezi Valley, also great fault with the climate of Equatorial West Africa. In those cases the climate is actually unhealthy to white men or women, and I doubt if any serious white colonization can be attempted there. I equally doubt the same about the Isthmus of Panama. The mosquito netting there may have saved you from germ diseases to a great extent, but it cannot modify the temperature and the humidity in the atmosphere. Of course the great point in Rhodesia is not to fight the climate (which you may describe generally as being perfectly healthy), but the germ diseases. But you cannot work the land scarcely even in South Africa without the partnership of the black man. Although one may say Trans-Zambezia is a country perfectly suited to white colonization, it is almost impossible for certain forms of labour to be undertaken by white men. We must work in those regions of South and Central Africa in partnership with the negro, and unfortunately the negro's arterial system is a reservoir of germs. So long as we can eliminate the connecting agency of the insect bloodsucker, we can get along well enough together; but the great problem is always how to eradicate all the insects and ticks which act as germ-conveying agencies. Mention has been made of the tsetse fly. We know by studying the past of Africa that we can eliminate the tsetse fly by various measures—by clearing away all superfluous growth of vegetation of the bush character. If you keep your grass very low and cut down the underwood of the forests, you go very far towards abolishing the tsetse fly, because it dislikes the wind of all things, and desires to take refuge in coarse vegetation. Another most competent agency on our side is the insect-eating bird; and this is a direction in which I hope the Chartered Company will range itself alongside the latest conclusions of zoological science and do all in its power to influence these 32,000 white men and women towards protecting all the insectivorous birds of the country. There are very few wild birds in Rhodesia that seriously injure man's crops. If there are such, they must be kept under control. But the greater number of the insect-eating birds are man's most valuable allies in eliminating the mosquito, the tick, and the tsetse fly. The Guinea fowl devours the larvæ which the fly deposits in the ground. Even though you may deprive yourself sometimes of a toothsome form of food, the more Guinea fowl you can induce to live in the country the less tsetse fly you will have. Then there are the beautiful white herons, generally styled "egrets." Most forms of white heron, especially the smaller ones, live mainly on flies, but the ignorant, stupid Europeans go about

the country destroying the egrets wherever they can. I have seen many a book on Rhodesia recounting how the traveller came away well stored with aigrettes for the womenfolk who were with him or whom he was going to rejoin. I hope Rhodesia may put in force a system of bird protection.

I should like to say this, in acknowledgment of the many directions in which the Chartered Company has striven to foster knowledge, that they have done a great deal through their administrators to promote the study of native languages. Some years ago I read a report emanating from Brussels at the time the Belgians were taking over the Congo Free State, in which a distinguished Belgian Congo official, who has since figured honourably in the present war, described—obviously only for the reading of Belgians—how admirably organized was officialdom in Northern Rhodesia as regards the acquisition of native languages. He attributed the influences that the officials of this Company have over the natives to the extent to which they master the native languages and got into touch with the native people. I therefore wrote to Mr. Wilson Fox to tell him I was endeavouring to complete a voluminous work on the Bantu languages and that I found the more recondite speech-forms of Northern Rhodesia were almost unknown. I asked if he could send out certain instructions to the men out there asking them to fill up vocabularies for me. Before many months had passed I got in this way a rich harvest of information which will be profoundly interesting to those who attempt to trace the past history of Africa from evidence in language and similarity of customs. This information has also shown the comparative stability of these Bantu languages spoken by comparative savages. For about the same time Dr. Peringuey of the Cape Museum kindly had copied out for me the manuscript vocabularies of Livingstone compiled for the most part between 1849 and 1855, in what we should now call Northern Rhodesia. Livingstone was so far in advance of his time that he wrote according to the best and most accurate phonetic notions of the present day. His vocabularies placed side by side with those sent to me many years afterwards might have been written by the same person and show how very little these forms of native speech have varied in sixty years.

I think we may feel reassured in knowing that so much of Central Africa lies under the direction of the Chartered Company, and of Mr. Wilson Fox in particular. I for one hope that my map shown to you last year may before long be the only correct one as regards the boundaries of Rhodesia, a Rhodesia with direct access to the Atlantic Ocean through the northern part of what has ceased to be "German" South-West Africa.

MR. F. P. MENNELL: I should like to congratulate Mr. Wilson Fox on the very interesting paper he has presented to us. Some remarks have been made about the number of maps he has produced, and he has shown a great number illustrating various stages of the development of the country. Perhaps as one who is interested very much in the scientific side of geography I might suggest that the Chartered Company should undertake to put on record one very useful piece of information. In these tropical countries so much depends upon altitudes. In Southern Rhodesia we have no facts on which to base any idea as to how much of the country is at different altitudes. I think it would be one of the most useful works that could be performed to publish some sort of contoured map of the country. A good deal has recently been done in the way of mapmaking, I am very glad to say, and I should like to give this hint to the Chartered Company, for more propitious times, that one of the most useful forms of activity they could undertake would be to produce some sort of contoured map of the country. I do not think I wish to say anything more except

to congratulate Mr. Wilson Fox on the very interesting paper and beautiful photographs he has shown this evening.

The PRESIDENT: I will conclude by adding my thanks to those which have already been paid to Mr. Wilson Fox for the lecture he has given us, and I am sure I may include the thanks of the meeting. We must all have appreciated the example which he set in sticking to his text, and avoiding all the temptations to dwell upon other aspects, political or picturesque, of this very interesting region. Rhodesia I think has been fortunate in the first place in its name. It is a great thing to have a name that is at once personal and historical, and recalls its earliest founder. Rhodesia has not been forced to take refuge under one of those names depending on a weathercock which other parts of Africa have had to submit to. Rhodesia has also been fortunate in its early history. In the first place it had at its birth the impulse of the unique energy of its founder Cecil Rhodes, one of the greatest makers of Empire, and in its childhood it has had for its administrators a number of able men, some of whom we have here to-night—men who were not too tightly bound in the swaddling clothes of Downing Street, and were relatively free from the interference of the irresponsible Parliamentary critic. In this way it has, at relatively small cost and trouble to the old country, obtained the prosperity it has already reached. It must be a source of pride to all Englishmen to see that this new country has not only pulled through the various trials it has had in its youth, but that now in the world-tempest in which we live it can look forward to the future with perfect hope and confidence. Great possessions, of course, bring to Imperial States not only privileges but responsibilities, and England can congratulate herself on the fact that in this region we have not only found a new home for Englishmen, but have also given to the native races freedom from the slave trade and from the savage rulers under whom they suffered in olden days. There is another, quite a different proof of the prosperity of Rhodesia, which I have gathered from the newspapers during the last week. I am told that Rhodesian interests have produced one of the longest lawsuits which has ever been known in this country. That is a fact which shows that there must be a great deal of South African gold in process of distribution among a presumably deserving profession in this country, and I congratulate both Rhodesia and the Bar on a singular incident.

I will not detain you for more than a few moments with my personal recollections of Rhodesia. I am ashamed to say I have only been there, not as a "globe-trotter," but as a globe-galloper. I was carried round in the wake of the British Association ten years ago, and I am afraid a great many of my recollections relate to time relatively wasted in sumptuous lunches and much speech-making; but I have some other recollections. I brought back a general picture of the country as an eminently livable and pleasant country, with hills and horizons and rivers and all the outdoor things that make life worth living, including a good climate. In Rhodesia there was none of the tropical aloofness which you feel in the lower parts at least of East Africa. Among individual localities the first I recall is a place that has been mentioned to-night, Umtali. It was like a long straggling English village street, climbing up the slope of pleasant green hills. Then there is Bulawayo, which I dare say has grown a good deal since I was there. Towns grow very quickly in Rhodesia. When I recollect it, it seemed rather a fragment or specimen of a town in making. It had a fine square, and some half-finished streets and one or two shops with plate-glass windows, and a Museum, and a general air of being a little surprised at what it had done already. Nor can one forget the wonderful landscapes of

the Matoppo hills, those abrupt-sided flat-topped granite crags with smaller blocks piled about them. The whole landscape, giving an impression of something weird and large and solemn, is a proper burial-place for the founder of Rhodesia. And in conclusion, even though they have been described over and over again, and word-painting is wasted on them, I must add my humble tribute to the Victoria Falls. There are few of the wonders of the world which, when seen for the first time, do not disappoint; but I rank the Victoria Falls, together with Venice and Constantinople, and the Colorado Cañon, and the snows of Kangchenjunga, among the great sights, which are greater than all descriptions. Niagara, in comparison, is commonplace. It is a monstrous weir surrounded by workshops and advertisements! The Victoria Falls stand for poetry and romance. They are a world of separate waterfalls, one after another, all of the most intricate beauty, veiled but not concealed in the cloud of spray which feeds the green wilderness which makes the framework of the whole picture. I hope we shall all be able before long to take the trans-Continental railroad across Africa, and spend a happy fortnight at the Victoria Falls. To that consummation I am sure that the lecture we have heard to-night will be a stepping-stone, and once more I thank Mr. Wilson Fox for it.

THE MIDDLE TEES AND ITS TRIBUTARIES; A STUDY IN RIVER DEVELOPMENT.

C. B. Fawcett, B.Litt.

Read at the Afternoon Meeting of the Society, 20 January 1916.

MIDDLE Teesdale is that part of the Pennine slopes which stretches eastward from Stainmore. It is part of the drainage area of the Tees, and is clearly marked off from Upper Teesdale by the high ridge of moorland through which the river breaks at the Eggleston Gap and by the distinct physical characteristics of the Upper Dale. This dale is markedly wider than any of its neighbours. Along a north-south line drawn near Barnard Castle the widths of these dales below the 1000-foot contour-line are—

Weardale	...	...	...	...	from 2 to 3 miles.
Teesdale	...	...	...	...	„ 9 „ 10 „
Swaledale	...	...	...	...	„ 1 „ 2 „

This exceptional width of Teesdale suggests that its development is worthy of study. It is one of the facts that this paper attempts to explain.

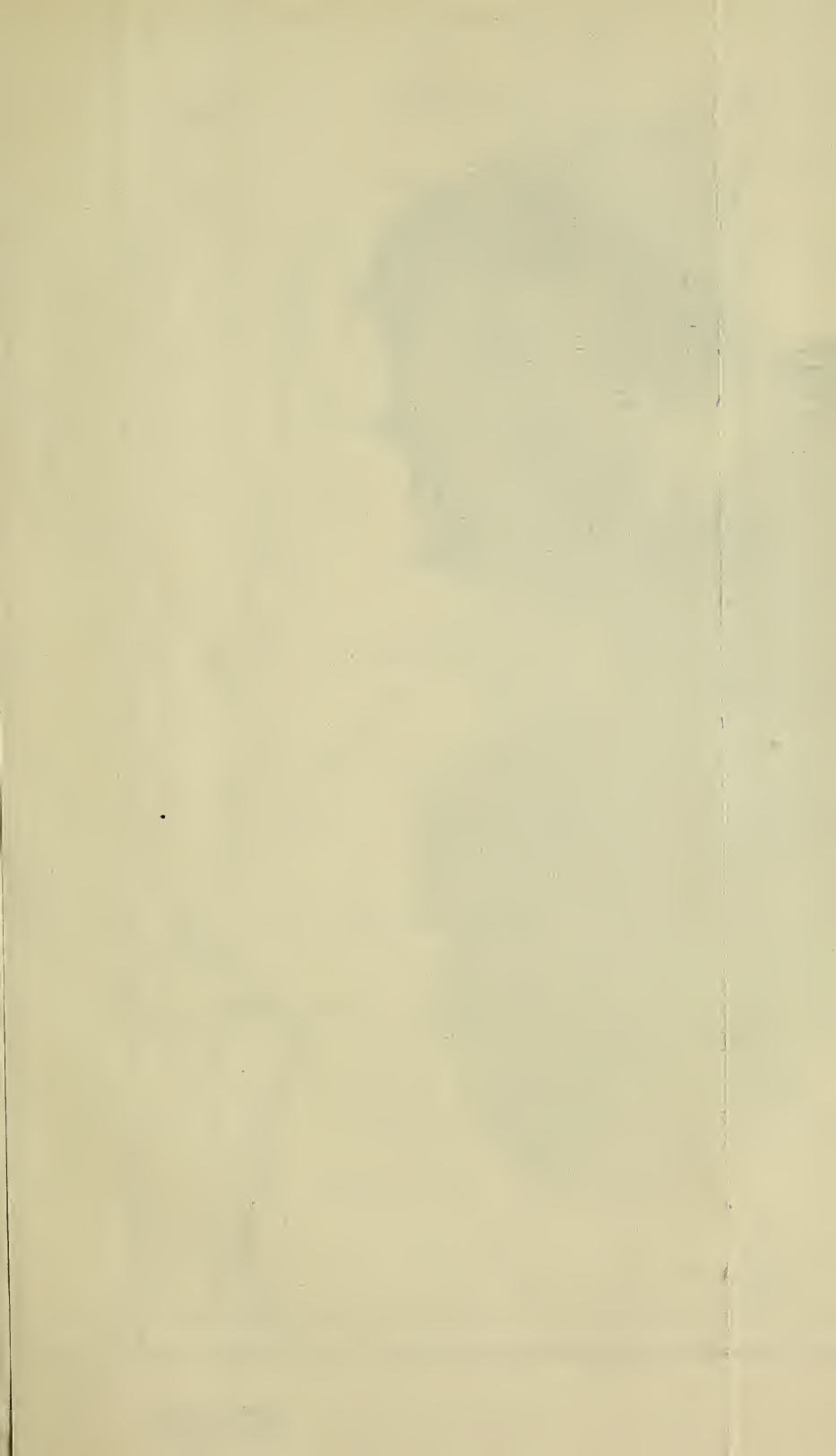
The landscapes of the dale are characterized by the intermingling of three principal types of land-form—

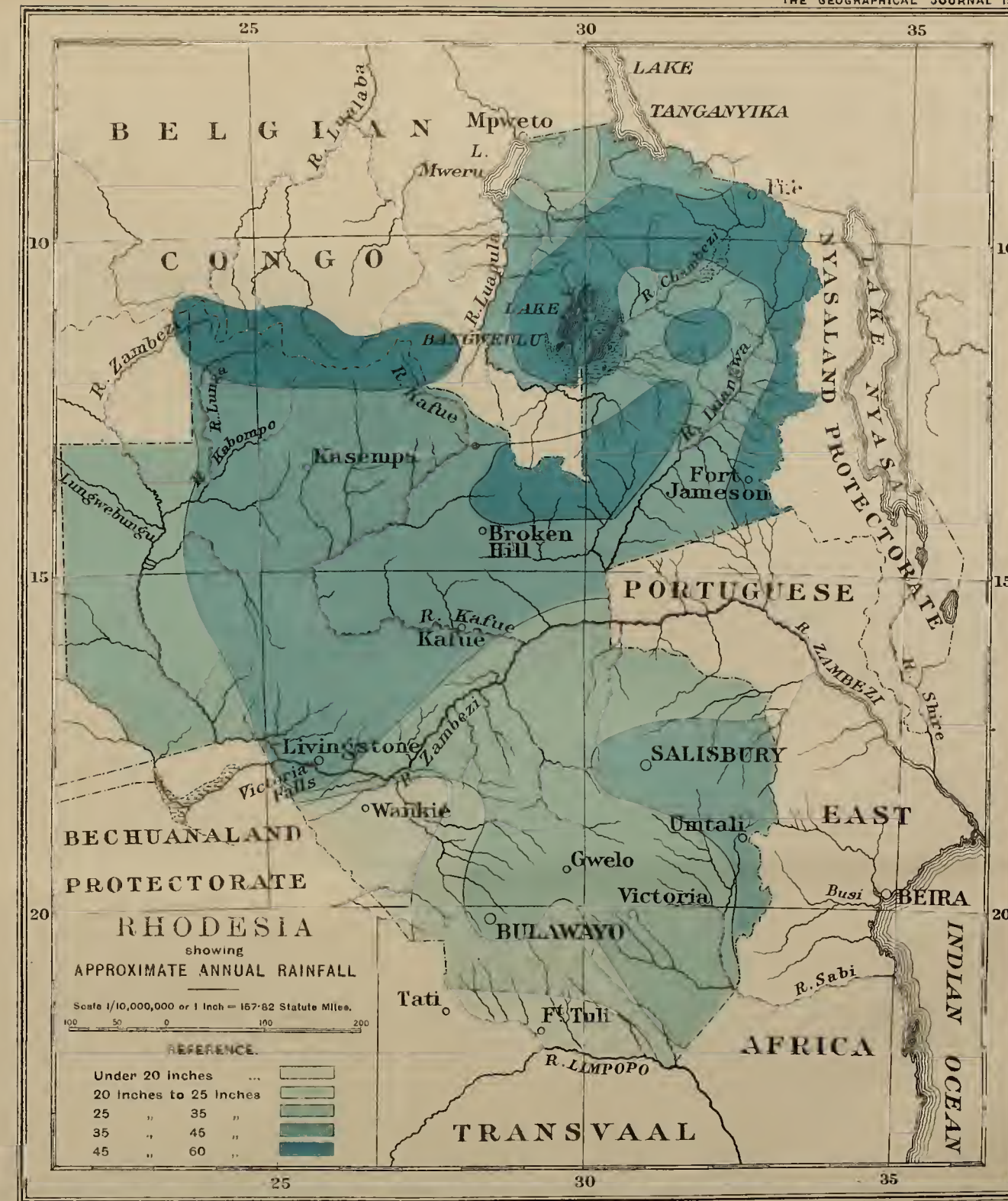
(1) First there is a wide, comparatively smooth upland surface. If the valleys were filled up this surface would be that of a plain dipping gently to the east and cutting across the strata at a small angle.

(2) The second group of land forms is the series of wide shallow valleys which are sunk below the upland surface. In the west they occupy the

WILSON FOX.







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